REMARKS

Claims 1-37 are pending in the application. Claims 1-27 are rejected. Claims 28-37 were allowed. Applicants gratefully acknowledge indication of allowability of claims 28-37. Claims 1, 5, 7-10, 15-19 and 26-27 have been amended. No new matter has been added. Claims 6 and 11 were cancelled. Applicants respectfully request reconsideration of the rejections set forth in the Office Action dated April 9, 2004 in view of the preceding amendments and following remarks.

Claim 1 has been amended to clarify one energy efficient aspect of the present invention and now recites "wherein the device is arranged such that elastic potential energy of the polymer is substantially independent of deformation of the first portion". Support for this aspect of the present invention may be found in the specification, for example, on pages 20-28, FIGs. 1D and 3A, and specifically on page 16, line 24 to page 17, line 27 and page 21, line 7 to page 22. As mentioned in the Specification, as a result of an elastic energy balancing arrangement in a polymer, deflection along an equipotential line does not need to overcome elastic energy of the polymer. For actuation, arranging the device in this manner increases mechanical output for a given electrical input.

Claim 19 has been amended to clarify another energy efficient aspect of the present invention and now recites "one or more structures that constrain deformation of the polymer such that elastic potential energy of the device is substantially independent of deformation of the first portion". Support for this aspect of the present invention may be found in the specification, for example, on pages 20-28, FIGs. 3A, 3B and 3C, and specifically on page 21, line 23 to page 23, line 20. As mentioned in the Specification, a motion constraint or mechanism, such as a crank, constrains deflection of the polymer and holds deflection such that elastic potential energy of the device is substantially constant during the deflection, e.g., along an equipotential line defined by the crank turn radius. The motion constraint or mechanism provides forces perpendicular to the equipotential line at any given point to maintain deflection along the equipotential line.

Rejections Under 35 U.S.C. § 112

Claims 6 and 11 were rejected to under 35 U.S.C. 112, second paragraph, as begin indefinite. The claims have been cancelled without prejudice to further prosecution. Correspondingly, Applicants respectfully request withdrawal of the rejection under 35 U.S.C. § second, second paragraph.

Rejections Under 35 U.S.C. § 102/103(a)

Claims 1-4 and 15-21 were rejected under 35 U.S.C. § 102(a) as being anticipated by Yamamuro, Yoshida or Edelman.

Claims 5-7 were rejected under 35 U.S.C. § 102(a) as being anticipated by Yamamuro or Edelman.

Claims 8-14 and 22-25 were rejected under 35 U.S.C. § 102(a) as being anticipated by Yamamuro.

Claims 26-27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamuro.

Claims 1-5, 8-10 and 12-18 now recite a device for converting between electrical energy and mechanical energy with "a second portion of the electroactive polymer that stores mechanical input energy in tension" and "wherein the device is arranged such that elastic potential energy of the polymer is substantially independent of deformation of the first portion". Applicants note that this limitation is supported by sufficient structure in the claims and not solely functional language. FIGs. 1D and 3A, for example, illustrate several exemplary portions of an electroactive polymer that each may store mechanical energy in tension such that elastic potential energy of the polymer is substantially independent of a deformation.

Yamamuro, Yoshida or Edelman, either alone or in combination, do not teach or suggest "wherein the device is arranged such that elastic potential energy of the polymer is substantially independent of deformation of the first portion".

Claims 19-27 now recite a device for converting between electrical energy and mechanical energy comprising "one or more structures that constrain deformation of the polymer such that elastic potential energy of the device is substantially independent of deformation of the first portion". Yamamuro, Yoshida or Edelman, either alone or in combination, do not teach or suggest such a device.

Withdrawal of the rejections under 35 USC 102(a) and 35 USC 103(a) are therefore respectfully requested.

CONCLUSION

Applicants believe that all pending claims are allowable and respectfully requests early Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP

William J. Plut
Limited Recognition under 37 C.F.R.§10.9(b)

P.O. Box 778
Berkeley, CA 94704-0778
510-843-6200

BEFORE THE OFFICE OF ENROLLMENT AND DISCIPLINE
UNITED STATES PATENT AND TRADEMARK OFFICE

LIMITED RECOGNITION UNDER 37 CFR § 10.9(b)

William Plut is hereby given limited recognition under 37 CFR § 10.9(b) as an employee of the Beyer Weaver & Thomas, LLP law firm to prepare and prosecute patent applications wherein the patent applicant is the client of the Beyer Weaver & Thomas, LLP law firm, and the attorney or agent of record in the applications is a registered practitioner who is a member of the Beyer Weaver & Thomas, LLP law firm. This limited recognition shall expire on the date appearing below, or when whichever of the following events first occurs prior to the date appearing below: (i) William Plut ceases to lawfully reside in the United States, (ii) William Plut's employment with the Beyer Weaver & Thomas, LLP law firm ceases or is terminated, or (iii) William Plut ceases to remain or reside in the United States on an TN visa.

This document constitutes proof of such recognition. The original of this document is on file in the Office of Enrollment and Discipline of the United States Patent and Trademark Office.

Expires: April 21, 2005

Harry I. Moatz
Director of Enrollment and Discipline